

CLAIMS

1. A planar lightwave circuit type variable optical attenuator having waveguides formed on a substrate, said
5 variable optical attenuator comprising:

an input waveguide;

a first optical coupler;

a second optical coupler;

10 two arm waveguides connecting said first optical coupler to said second optical coupler; and

an output waveguide, wherein

each of said first optical coupler and said second optical coupler is a directional coupler having a region in which said two arm waveguides are brought in close
15 proximity to each other; and

a polarization mode coupling in said first optical coupler and said second optical coupler is equal to or less than -25 dB.

20 2. The planar lightwave circuit type variable optical attenuator as claimed in claim 1, wherein an absolute value of a waveguide birefringence at optical coupler sections constituting said first optical coupler and said second optical coupler is equal to or greater than 3.5×10^{-4} .

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3. The planar lightwave circuit type variable optical attenuator as claimed in claim 1 or 2, wherein

said first optical coupler and said second optical coupler are a directional coupler constructed by bringing said two arm waveguides in close proximity to each other.

5 4. The planar lightwave circuit type variable optical attenuator as claimed in any one of claims 1-3, wherein
a length of said arm waveguides is designed to be equal
to an integer multiple of an optical beat length obtained
by dividing a used optical wavelength by the waveguide
10 birefringence.

5. The planar lightwave circuit type variable optical attenuator as claimed in any one of claims 1-4, wherein
at least one of said two arm waveguides has a phase
15 controller; and

said variable optical attenuator functions as a
variable optical attenuator or optical switch.

6. The planar lightwave circuit type variable optical
20 attenuator as claimed in any one of claims 1-5, wherein
said substrate is a silicon substrate, and said
waveguides are silica-based glass waveguides.